Interim Report on Public Hearings

City of Winnipeg Wastewater Collection and Treatment Systems

"Sewage Spill"

Commissioners:

Terry Duguid, Chair
Ian Halket
Myrle Traverse
Ken Wait

April 2003

Manitoba Clean Environment Commission
305-155 Carlton Street
Winnipeg, Manitoba R3C 3H8

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Executive Summary

At the request of the Minister of Conservation, the Manitoba Clean Environment Commission conducted public hearings on the City of Winnipeg's wastewater collection and treatment systems. The hearings were called, in part, in response to a release of raw sewage from the City's North End Water Pollution Control Centre into the Red River that lasted from September 16 to 19, 2002. The mandate given the Commission was to review the City's wastewater collection and treatment systems and related public concerns, and to provide a report to the Minister with advice and recommendations.

Public hearings were held in Winnipeg from January 20 to 23, 2003 and in Selkirk from January 27 to 28, 2003. The hearings were attended by over 500 members of the public. The four-member panel heard presentations from Manitoba Conservation, the City of Winnipeg, Environment Canada, as well as a funded participant (Ad hoc Group) that received funding from a Participant Assistance Program. Written and oral presentations were received from 21 other organizations and individuals. The City of Winnipeg's presentation featured a long-term Pollution Prevention Plan that addressed wastewater disinfection, combined sewer overflows, effluent quality, risk and criticality assessments, and other control measures. A total of 82 exhibits were registered by the Commission during the six days of hearings.

Two motions were presented by the funded participant on January 20, 2003 that called for suspension of the proceedings, further public review and preparation of an Environmental Impact Statement. The Commissioners considered the motions during the course of the hearings. On January 28, 2003, in response to the motions, the panel requested that the City submit an Environmental Impact Statement to assist in its review. The federal Minister of Environment was also requested to provide a report by March 10, 2003 on the status of their investigation into the sewage spill.[1] The panel further advised that an interim report on the September 16, 2002 sewage spill would be filed with the Minister of Conservation on or before April 1, 2003 and that the public hearings would reconvene in April, 2003.

During the course of the hearings, the Commissioner heard a number of concerns from members of the public regarding the September 16, 2002 spill of raw sewage into the Red River. Those concerns related to the effects of the spill on human health, water quality, aquatic biota,

[1]. The Commission is disappointed to report that an acknowledgement of the Commission's request had not been received from the Minister of Environment at the time that this report was submitted.

Netley-Libau Marsh and Lake Winnipeg. Some downstream residents and resource users testified that they were also concerned about the effects of combined sewer overflows and other releases of raw sewage. They demanded that measures be taken immediately to prevent the occurrence of sewage spills in the future. The Commissioners also heard presentations about proposed risk and criticality assessments, environmental management systems, emergency response plans and public notification systems, as well as the need to train and certify plant *Operators*, and put in place written operating procedures.

The Commission also reviewed reports on the September 16, 2002 spill prepared by Manitoba Conservation, the City of Winnipeg and Associated Engineering. These reports concluded that the spill occurred following a shutdown of the North End Water Pollution Control Center that was caused by the flooding of pump wells. The flooding was attributed to inadequate operating and maintenance procedures. Information from an ongoing investigation of the sewage spill by Environment Canada was not available to the Commission.

The Commission concluded that, while the Pollution Prevention Plan being proposed by the City of Winnipeg is a positive step forward, an Environmental Management System following the ISO 14001 Standard is required for the City's three Water Pollution Control Centres to provide greater assurance that future sewage spills will be prevented. In summary, the Commission recommended that the Water and Waste Department:

- Immediately begin to develop and implement an Environmental Management System (EMS) for the City of Winnipeg's wastewater treatment facilities. The EMS is to be completed within two years, with major components implemented much sooner.
- Undertake risk and criticality assessments of the City's wastewater treatment facilities within one year.
- Begin immediately to prepare and implement a training plan for all wastewater treatment facility staff within one year.
- Prepare and implement standard operating and safe work procedures for the City's wastewater treatment facilities within six months.
- Give immediate priority to the preparation of emergency response plans for the City's wastewater treatment facilities. The plans are to be completed and approved by Manitoba Conservation within six months.
- Develop and implement a notification system to inform the public whenever there is release of raw sewage into the Red and Assiniboine rivers whether it is an accidental release, combined sewer overflow or sanitary sewer malfunction. The notification system is to be fully operational for the 2004 summer recreation season.

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1.0 Introduction

On September 16, 2002, an incident occurred at the City of Winnipeg's North End Water Pollution Control Centre (NEWPCC) that resulted in a release of raw sewage into the Red River. The release continued over a 57-hour period during which time 427 million Litres of untreated sewage was discharged into the river. The sewage spill resulted in widespread public concern, particularly by downstream residents and resource users, and extensive media coverage. A number of actions resulted from the spill including investigative reports by the City of Winnipeg, Manitoba Conservation and Associated Engineering, an ongoing investigation by Environment Canada, a water quality assessment by Manitoba Conservation, and public hearings by the Manitoba Clean Environment Commission.

The mandate given to the Commission on October 3, 2002 by the Minister of Conservation included a review of the September 16, 2002 sewage spill and an examination of the reliability of the City of Winnipeg's wastewater collection and treatment systems to prevent discharges of inadequately treated sewage to the rivers during malfunctions. It also included a review of the adequacy of the Water and Waste Department's plan and schedule to upgrade its sewage collection and treatment systems. Commission hearings on the City's wastewater systems are ongoing and will conclude with a full report to the Minister.

The purpose of this report is to provide the Minister of Conservation with interim advice and recommendations with respect to the impacts and responses to the September 16, 2002 spill of raw sewage into the Red River from the NEWPCC.

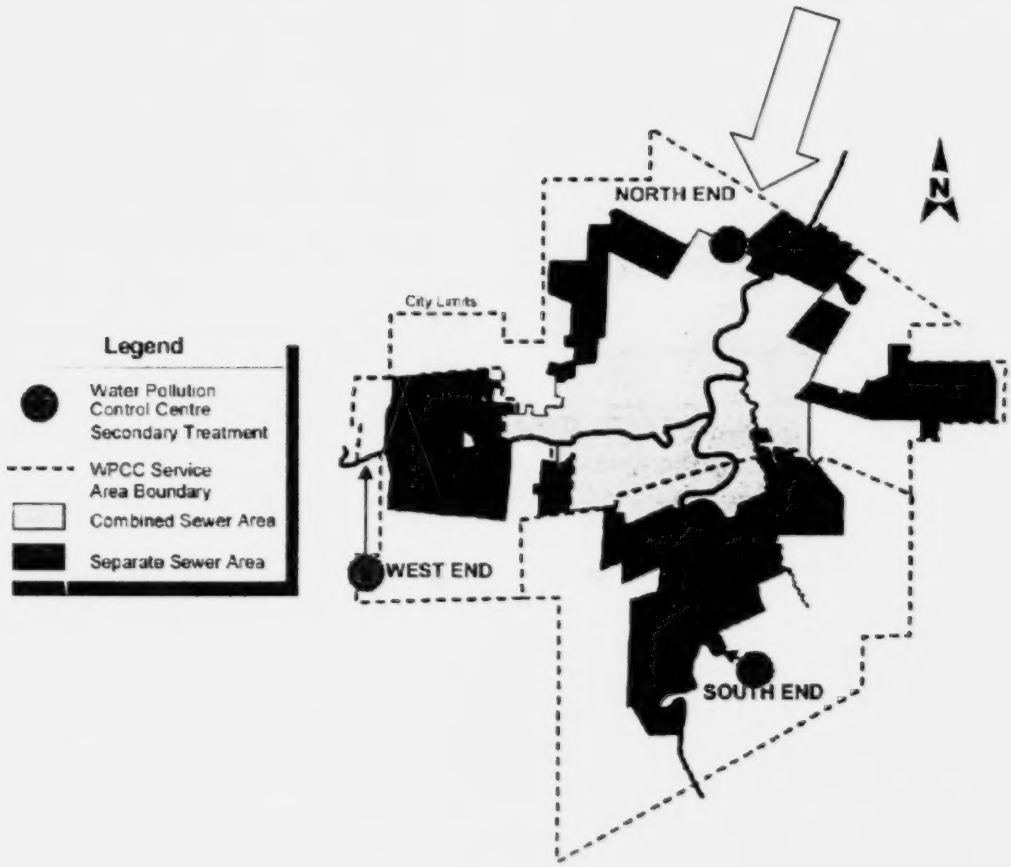

Figure 1. Locations of the City of Winnipeg Water Pollution Control Centres.

2.0 Clean Environment Commission Public Hearings

On October 3, 2002, the Minister of Conservation requested that the Clean Environment Commission convene public hearings to review the City of Winnipeg's wastewater collection and treatment systems (Exhibits 1 and 2). The Commission was also asked to provide a report with advice and recommendations to the Minister within six months. Terms of reference established for the public hearings are provided in Appendix A.

A Participant Assistance Program for the public hearings was announced by Manitoba Conservation on November 7, 2002 with applications due on November 25, 2002. Two successful applicants were awarded a combined total of $30,000 based on recommendations by a three-member participant assistance panel established by the Commission. One of the successful applicants declined the award.

The Commission, represented by Terry Duguid (Chair), Myrle Traverse, Ian Halket and Ken Wait conducted the hearings in Winnipeg from January 20 to 23, 2002 and in Selkirk from January 27 to 28, 2003. The Commission heard presentations from Manitoba Conservation, the City of Winnipeg, a funded participant, and other interested groups and individuals. Two motions were tabled on January 27, 2003 that called for suspension of the proceedings, preparation of an Environmental Impact Statement and further public review of the documentation (Exhibits 49 and 50).

On January 28, 2003, in response to the motions, the Commission requested that the City of Winnipeg provide additional information in the form of an Environmental Impact Statement to assist in its review (Exhibit 82). The Commission advised that it would be seeking the involvement of various federal departments including a request to the federal Minister of Environment that information on Environment Canada's investigation into the September 16, 2002 sewage spill be made available to the Commission.[1]

The Commission also advised that interim advice and recommendations respecting the impacts and responses to the September 16, 2002 sewage spill would be filed with the Minister of Conservation on or before April 1, 2003, and public hearings to consider the requested documentation would reconvene in April, 2003.

[1]. The Commission is disappointed to report that an acknowledgement of the Commission's request had not been received from the Minister of Environment at the time that this report was submitted.

3.0 North End Water Pollution Control Centre

The City of Winnipeg North End Sewage Treatment Plant opened in 1937. The plant has been upgraded and expanded over the past 66 years to become the North End Water Pollution Control Centre (NEWPCC) (See Figure 1). The NEWPCC treats municipal wastewater generated from the north and central parts of Winnipeg, representing about 70% of the City or approximately 370,000 residents. Treated wastewater from the NEWPCC is discharged to the Red River which then flows about 50 kilometres north to Lake Winnipeg. The NEWPCC is the largest of three wastewater treatment facilities serving the City of Winnipeg, and provides primary and secondary activated sludge treatment, and sludge processing.

Sewage enters the NEWPCC by flowing through the main interceptor into a surge well located 16 metres below ground level (See Figure 2). From the surge well, sewage flows through either the east or west suction header (or conduit of the influent pumping system) into the three pump wells. There are two pumps in each pump well. The number of pumps in use at one time is determined by the amount of wastewater flowing into the plant, which depends on rainfall, surface runoff and time of day. The pumps lift the sewage above ground level into a discharge chamber, which flows to the first stage of treatment known as pre-aeration and grit removal. Sewage then flows by gravity through the rest of the facility for treatment.

The NEWPCC influent pumping system was developed in stages. The main building was constructed in 1936-37. The east suction header and three pumping units were installed at the same time. In 1954, two additional pumping units were added. A major expansion from 1963 to 1965 included construction of the west suction header and the raw discharge well and installation of new higher capacity pumping units. These new units were connected to the new west suction header. An elevator was also added at pump well No. 1 to provide improved access for plant staff. In 1981, the last pumping unit was added in pump well No. 1 and connected to the east suction header. Pump controls were last upgraded in 1990.

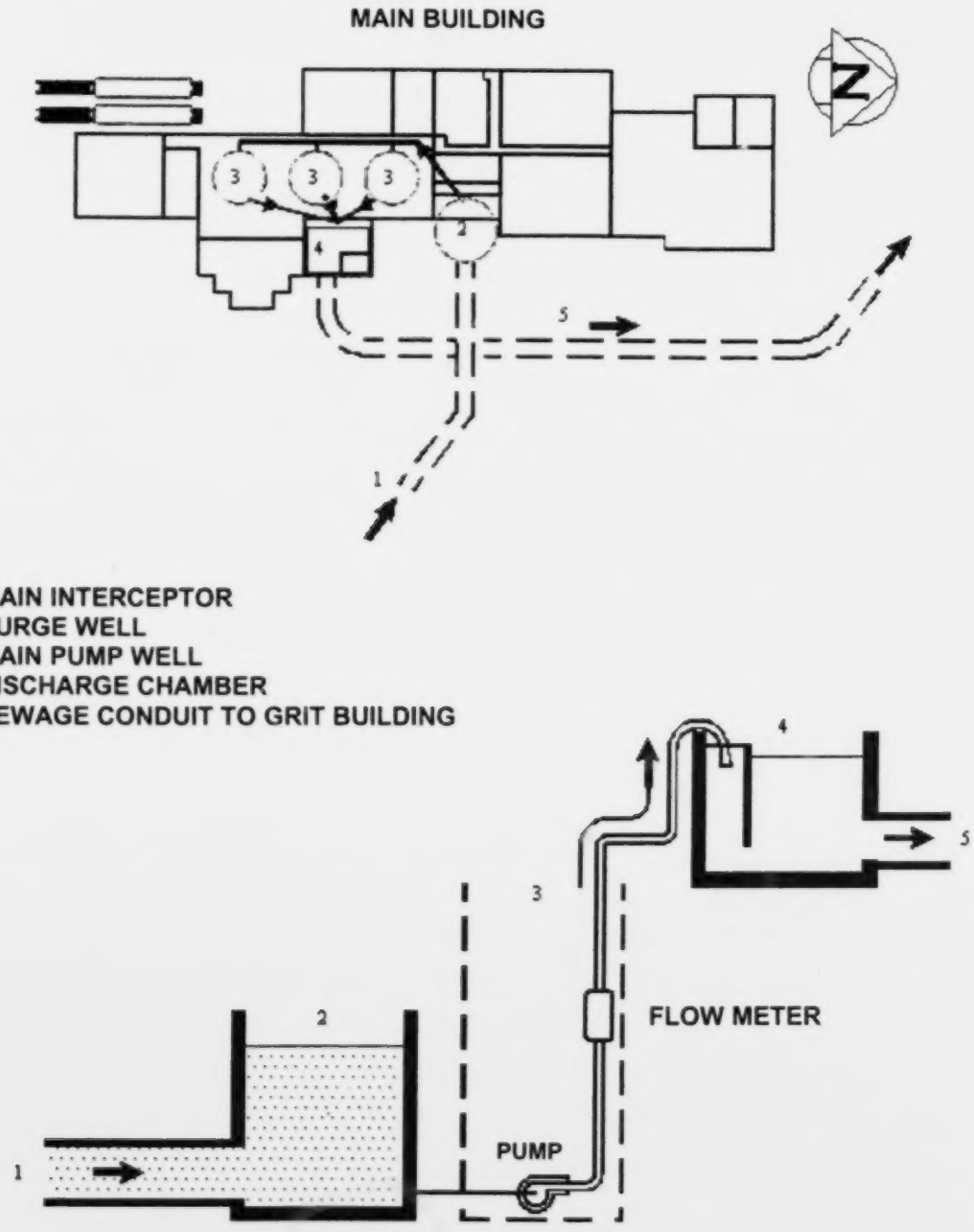

Figure 2. North End Water Pollution Control Centre influent pumping system.

4.0 Sewage Spill

4.1 Spill Description

Early in the afternoon on September 16, 2002 an incident occurred at the City of Winnipeg's North End Water Pollution Control Centre that shut down the sewage treatment facility for about 2.4 days (57 hours). A 25.4 cm inspection plate on pump No. 5 was blown-off as it was being removed allowing sewage to flow into the pump well. The three pump wells flooded through interconnecting tunnels submersing the motors and other equipment, and resulting in the shutdown. Raw sewage began flowing into the Red River at about 5:00 p.m. on September 16, 2002. Approximately 427 million Litres (185 million Litres per day) of sewage were discharged in the Red River until the plant was put back into service with two operational pumps at about 1:30 a.m. on September 19, 2002. Initially, there was a graduai reduction of sewage discharged into the river and by about 2:00 a.m. all untreated discharges to the river had ceased.

4.2 Spill Reports

Three reports on the September 16, 2002 spill of raw sewage into the Red River were entered as exhibits at the public hearings. The reports were authored by Manitoba Conservation (Exhibit 43), City of Winnipeg (Exhibit 40) and Associated Engineering (Exhibit 41). Information on Environment Canada's ongoing investigation into the sewage spill was not provided to the Commission at the time of the hearing.

4.2.1 Manitoba Conservation

Manitoba Conservation's investigation of the September 16, 2002 sewage spill consisted of observing remedial work at the NEWPCC and interviewing Water and Waste Department staff regarding the incident (Exhibit 43). The report concludes that the direct cause of the raw sewage release was flooding of the pump wells and the resulting inability to pump sewage through the treatment plant. Manitoba Conservation's report provides conclusions and recommendations regarding the sewage spill that include isolation of pump wells, design of a pump drainage system, installation of monitoring devices, and implementation of programs to investigate problems and to test valves.

4.2.2 City of Winnipeg

The Water and Waste Department's internal review of the September 16, 2002 shutdown of the NEWPCC included descriptions of the wastewater treatment facility, maintenance history for pump No. 5, events leading to and following the sewage spill, communications with regulatory authorities and the public, and water quality impacts (Exhibit 40). The review report concludes with recommendations dealing with operational procedures, facility design and emergency response. Recommendations include preparing procedures for isolating pumps, altering the main building pumps, preparing procedures for other key activities, placing external marking on valve stems, reviewing training procedures, and identifying and mitigating risks of future spills.

4.2.3 Associated Engineering

Associated Engineering's review of the failure of the influent pumping system at the NEWPCC consisted of visual inspections, interviews with City staff and examination of background information and current regulations (Exhibit 42). The review focused on the influent pumping area of the plant. The review report presents recommendations on the design of the pumping system, conduct of a hazard and risk assessment, preparation of safe work procedures, upgrade of pump isolation and training procedures, drafting an emergency response plan, compliance with workplace safety and health legislation, and development of a performance system.

4.3 Cause of the Spill

Both the Water and Waste Department and the Manitoba Conservation reports (Exhibits 40, 43, respectively) conclude that mechanical failure in the isolating valve on the suction side of raw sewage pump No. 5 was the direct cause of the sewage spill. The actual valve failure resulted from a missing section of the valve guide on one side of the casing. Consequently, a cast iron disc that moves up and down along the valve guides would not fit properly. Possible reasons given for the missing section were that the section of the guide was never installed, the guide section was removed, or the guide became dislodged.

The Associated Engineering report (Exhibit 41) attributes the flooding of the pump wells and the consequent spill to inadequate operating and maintenance procedures while attempting to drain the pump casing. The report noted that there were prior indications that the valve was not in the closed position and isolation of pump No. 5 had not been achieved.

4.4 Conclusion

The failure to adequately close the isolation valve, which resulted in the sewage spill on September 16, 2002, dates back to 2001. During the intervening time-period, there were indications that the subject valve was not in the closed position and attempts to stop the flow had not been successful. These indicators appear to have been overlooked or misinterpreted by plant supervisors and staff, and work orders related to the problem were either not completed or were filed without action. A number of mechanical failure scenarios and inlet pumping system design deficiencies at the NEWPCC were also identified in the Manitoba Conservation and the Associated Engineering reports that still need to be addressed and corrected.

There have been other similar events in 1965 and 1993 related to pump well flooding and valve failure, which point to the high risk of flooding as a result of these failure scenarios and design deficiencies. During construction work carried out in 1965, an incident occurred at the NEWPCC when the suction valve for the main pump No. 1 was accidentally opened and flooded all three pump wells. A malfunction of pump No. 5's suction valve also occurred in 1993.

5.0 Issues

5.1 Wastewater Systems Reliability

The terms of reference for the Commission's review of the City of Winnipeg's wastewater collection and treatment systems includes a reliability assessment, especially the backup capability of the systems to prevent a discharge of inadequately treated sewage to the rivers during malfunctions (Exhibit 2).

The Commission heard testimony from the Water and Waste Department regarding the reliability of its wastewater collection and treatment systems and of the backup systems in place (Exhibit 39). The Department made specific reference to the design and operation of collection systems that include gravity flow in collection sewers and interceptors, redundant pumping units in lift stations, power interruption to lift stations, and monitoring and alarm systems. With respect to treatment systems the Department noted that reliability, redundancy, standardization are integral to their design and that vital components are designed to allow for repair or replacement without interrupting treatment.

The Water and Waste Department testimony included reference to the *Water Environment Federation Manual* of Practice No. 8, which provides reliability guidelines to determine the number of units and back-up systems required for major process components of wastewater treatment works. These reliability guidelines are based on Environmental Protection Agency (EPA) requirements. The Department stated that the City's three Water Pollution Control Centres (WPCCs) meet or exceed these guidelines.

The Water and Waste Department is proposing to undertake risk and criticality assessments at the three WPCCs that would assess reliability and backup capability of the treatment systems, estimate mitigation costs and develop a risk reduction plan, and implement mitigation measures to prevent the discharge of untreated sewage (Exhibits 9, 39, 46). The assessments would characterize the systems, determine critical assets, identify significant failures and adverse consequences, assess the likelihood of failure, evaluate existing countermeasures, estimate mitigation costs and develop a risk reduction plan. Subject to City Council approval, a risk and criticality assessment study would be undertaken over a 12-month period at a cost of about $750K and would be completed in 2004.

The Associated Engineering review of the NEWPCC failure (Exhibit 41) recommends changes to operating and maintenance procedures and plant modifications to reduce the possibility of a future failure. The review notes that failure of individual components of the influent pumping system, including suction valves, can occur and should be expected. The expressed intent of the review's recommendations is to ensure that component failures do not have disastrous consequences. The recommendations include a plant-wide assessment to identify hazards and risks including condition appraisal of equipment, safe job procedures and options for managing and mitigating risks.

The Water and Waste Department investigation into the raw sewage spill (Exhibit 43) concludes that the piped drainage system for the pumps is unreliable and the system has not worked satisfactorily for many years. The report recommends physical isolation of the three dry wells, upgrade of pump drainage systems, control mechanism improvements and changes to operating practices. The report also noted that actions should have been taken sooner to replace the current system.

The Commission also heard testimony regarding the reliability of Winnipeg's permanent sewage lift stations (Exhibit 74). Lift stations are used to raise the elevation of sewage so it can flow by gravity to the WPCCs. Concern was expressed that failure of the lift pumps during critical spring and summer periods could result in basement flooding and subsequent release of sewage into the Red River. It was recommended that the City of Winnipeg upgrade the reliability and capacity of lift station pumps, and adopt a minimum operating standard for all lift stations.

A member of the public also recommended that a risk assessment be undertaken for the design and operation of the City's wastewater treatment plants to identify and correct any other weaknesses in the treatment systems that could lead to plant incapacitation (Exhibit 57). It was recommended that contingency protocols should be developed and made available to employees, emergency response plans should be rehearsed and personnel should have adequate training for their jobs.

The Environmental Approvals Branch stated that risk and criticality assessments at the three WPCCs in 2003 should be mandatory (Exhibit 48). The Branch advised that comments on the completed assessments will be provided and necessary requirements would be addressed in the future by amending the terms and conditions of the Environment Act licences to be issued for the three WPCCs.

The Commission recognizes the need to undertake risk management at the three WPCCs and supports the Water and Waste Department's recommended course of action. The risk and criticality assessments should be undertaken within the time-frame recommended by Manitoba Conservation. However, the Commission believes that the City's approach does not go far enough and that an overall environmental management strategy is required. Accordingly, the proposed risk and criticality assessments should be conducted and implemented within the framework of an Environmental Management System as discussed in the following section.

5.2 Environmental Management System

The funded participant (Exhibits 51 and 53) and others (Exhibit 79) commented on the need for an Environmental Management System (EMS) for the City of Winnipeg's wastewater collection and treatment systems. Examples of other municipalities in Canada were cited where EMSs or similar environmental management plans were implemented (e.g. Vancouver, Calgary, Edmonton, Toronto, Ottawa and Hamilton). The International Standards Organization (ISO) 14001 EMS Standard entitled "Environmental Management Systems – Specification with Guidance for Use" was recommended for implementation. This Standard specifies requirements for an EMS to enable an organization to formulate a policy, objectives and targets taking into account legislative requirements and information about significant environmental impacts.

The funded participant commented that no City of Winnipeg department or operating agency has an environmental plan or EMS in place (Exhibit 51). It was further noted that Plan Winnipeg 2020 Vision (Exhibit 55) promotes environmentally responsible decision-making for the broad community and within its own operations, and that there is policy level support for environmentally responsible procedures such as an EMS. The Group suggested that Water and Waste Department put an EMS in place and that a corporate-level EMS be considered for all City of Winnipeg departments and operating agencies.

Members of the public expressed concerns during the public hearings regarding the September 16, 2002 sewage spill. The concerns included the need for documented procedures, staff training, emergency planning and due diligence (Exhibits 51, 53, 57, 79). One of the participants at the Selkirk session noted that due diligence is achievable through the implementation of environmental policies, environmental management plans, environmental management systems,

audits and inspections (internal and external), and planning (back-up systems, scheduled maintenance, staff training). An EMS was advocated at the hearings as an effective management tool for organizations to assess and control the environmental impacts of their operations and activities, and thereby provide for due diligence.

The Associated Engineering review of the NEWPCC failure recommends that a system be developed that identifies performance indicators and critical success factors to enable the Water and Waste Department to measure its performance and ensure that continuous improvement is achieved (Exhibit 41). The review suggests that an EMS provides for such measurement of an organization's environmental performance in relation to its environmental policy, objectives and targets.

Other evidence presented during the public hearings discussed how an ISO 14001 EMS would improve operation of the NEWPCC and prevent future raw sewage discharges (Exhibit 79). The EMS would provide the framework and establish formal procedures that define: the organization's environmental policy; environmental aspects and impacts; priorities, objectives and targets for environmental performance; clear responsibilities for implementation; and commitments to pollution prevention, continuous improvement and compliance with environmental legislation.

The Commission believes that a formal EMS is an effective means to ensure that the City of Winnipeg's wastewater collection and treatment systems operate in a safe and reliable manner, and serve to protect human health and the environment. Such a system could be developed to be consistent with applicable legislation, standards and best practices. An EMS would integrate environmental requirements into operational procedures and practices, allow for continual improvement of environmental performance, and provide for due diligence in the event of any future accident or malfunction. To be fully effective the EMS should adhere to the ISO 14001 Standard and should be registered and audited in accordance with other applicable ISO 14000 series standards. The environmental policy adopted by the Water and Waste Department as part of the EMS should be consistent with the environment policy framework of the City of Winnipeg and the Province of Manitoba. The Commission further believes that involvement of the City's Civic Environment Committee would be beneficial in developing an effective EMS for the Department and the City.

5.3 Staff Training

The Associated Engineering review of the sewage spill (Exhibit 41) notes that management responsible for the NEWPCC has made a commitment to training and comments that an extensive and complete training program appears to be in the early stages of development. The report recommends that training resources should be assigned to update and facilitate employee awareness, skills and safe work practices, and that training should include the regular review of, and revision to, operating and maintenance procedures.

Several presenters at the public hearings commented on the need for an appropriate level of training for WPCC operators (Exhibits 51, 53, 79) and made reference to other jurisdictions that have implemented mandatory operator training and certification as part of environmental management planning initiatives. Training was described as an example of due diligence.

The Water and Waste Department report on the shutdown of the NEWPCC lists training provided to staff employed in operating positions at the three WPCCs (Exhibit 40). The report identifies *Assistant Operator* as an entry-level position with minimal qualifications. *Assistant Operators* may be considered for promotion to an *Operator* after a minimum of four years of satisfactory performance, and *Operators* may become *Senior Operators* over time. Training of *Operators* continues with increasing familiarity and experience, and the addition of new equipment and changes to process techniques.

The Commission recognizes the importance of providing required training to all WPCC staff so that they can perform their assigned duties in a safe and effective manner. It is also important that plant operators are certified in accordance with national standards and every opportunity be provided to WPCC staff to become certified to perform their position duties effectively. The Commission believes that a formally approved training plan and an operator certification program are required, and that the plan and program should be developed within the framework of an EMS for the Water and Waste Department.

5.4 Operating Procedures

The Associated Engineering review (Exhibit 41) reports that documented standard operating and safe working procedures do not exist for the NEWPCC and that work performed at the facility has not been analyzed on the basis of risk, hazards and best practice. Only significant projects such as disaster maintenance and boiler cleaning have written guidelines. The lack of safe work

procedures was determined to be a major contributing factor in the flooding of the pump wells. This fact underscores the need to conduct safety audits to review and assess all work procedures, and to review the personal protection policy.

The Water and Waste Department's spill report (Exhibit 40) recognizes the need for prescriptive procedures to deal with critical operations. The report identifies requirements for formal written procedures that identify hazards, assign responsibilities and lists the steps for isolating critical equipment. Recommendations are provided in the report that includes the need for preparing written procedures to isolate pumps and other activities, and reviewing training for all procedures.

A presenter at the hearings observed that valves "break and jam", but expressed concern that there are no regular testing procedures or a manual checklist for valves and sensors at the NEWPCC (Exhibit 59). Another presenter explained that development and implementation of an EMS would improve the operation of the NEWPCC and help to prevent future sewage spills (Exhibit 79). The EMS would establish a formal set of procedures consistent with the ISO 14001 Standard including environmental aspects and impacts, legal and other requirements, objectives and targets and the environmental management program.

Based on the public testimony and the assembled evidence, the Commission concludes that formal procedures would have likely served to prevent the spill of raw sewage into the Red River and may have helped to minimize any adverse effects of the spill on the environment and human health. Written procedures are required for a large number of operation and maintenance activities at the three WPCCs. To be effective, the need for such procedures should be identified and required documentation should be prepared within the framework of an EMS for the Water and Waste Department. Whenever possible, existing "best practice" procedures from other jurisdictions should be adopted and, as appropriate, adapted for use by the Water and Waste Department.

5.5 Emergency Response Plan

Participants at the hearings spoke about emergency response planning or emergency preparedness for wastewater treatment plants and discussed the benefits to municipalities, businesses, human health and the environment. References were made to other municipalities across Canada that have implemented or are in the process of implementing emergency response plans and procedures (e.g. Calgary, Edmonton and Toronto). The funded participant

(Exhibits 51, 53) suggested that the City of Winnipeg prepare comprehensive emergency response plans for each WPCC and that the plans should be implemented within a City-wide emergency response plan with coordination among government, industry and the public.

The Associated Engineering review of the September 16, 2002 failure (Exhibit 41) comments that there are no established procedures at the NEWPCC for responding to emergencies and recommends that an emergency response plan should be drafted for the facility. The report goes on to state that flooding, fires, chemical spills and environmental threats are more effectively managed with a well-structured and rehearsed plan.

The Commission observed that the Water and Wastewater Department officials demonstrated responsibility by taking immediate action after the September 16, 2002 sewage spill, providing timely information to the public, and cooperating with Manitoba Conservation and other authorities. The City of Winnipeg spill report (Exhibit 40) notes that an emergency response plan was developed early after the incident and planning decisions were made on a timely basis. A plan to re-establish the wastewater treatment processes was established in the hour after the event. Daily briefings took place with key staff including department public information staff and representatives from Manitoba Conservation. The City's public information staff provided access for the media and prepared daily news releases on the event.

The Commission supports recommendations put forth at the public hearings suggesting that emergency response plans should be prepared for the three WPCCs and that the plans be integrated into a City-wide plan involving co-operation among government, industry and the public. To be effective, emergency response planning should be undertaken within the framework of an EMS for the Water and Waste Department. Further, emergency response plans should be prepared in accordance with accepted Manitoba and Canadian standards for emergency preparedness by industry.

5.6 Public Notification

The 1992 Clean Environment Commission report entitled "Application of Water Quality Objectives for the Watershed Classification of the Red and Assiniboine Rivers and Tributaries Within and Downstream of the City of Winnipeg" recommended that the then provincial Minister of Environment, in conjunction with other departments and the City of Winnipeg, should research and develop a *high fecal coliform level public warning system* for operation during the recreation

season. The warning system was to alert river and tributary users within the classification area when the fecal coliforms standard was exceeded. It was also recommended that the warning system should be in operation during the recreational season following attainment of compliance with fecal coliform objectives.

The Environmental Approvals Branch stated during the current public review that the warning system was not implemented (Exhibit 3). The Branch reasoned that routine exceedences of the fecal coliform objectives would continue to occur until disinfection is implemented at the NEWPCC. The general advice provided through warning signs posted during health emergencies was considered by the Branch to provide adequate protection of river users.

The Water and Waste Department report on the NEWPCC shutdown describes communications and public information following the incident (Exhibit 40). The Department reported the mechanical failure and shutdown within an hour to the Director, Environmental Approvals Branch, Medical Officer of Health, Winnipeg Regional Health Authority, Manitoba Health, Director of Operations, City of Selkirk and Chief Administrative Officer, Rural Municipality of St. Andrews. Mayor Glen Murray of the City of Winnipeg and others were also advised about the incident. A telephone message was also left for Environment Canada concerning the plant shutdown.

A City of Winnipeg news release was issued some four hours after the incident entitled: "Mechanical Failure Shuts Down the North End Water Pollution Control Centre". Subsequently the Departments Customer Service Centre was provided with information to assist staff in responding to calls from residents. News releases, media interviews, briefings and meetings followed over the following days until a final news release on November 20 entitled "Faulty Valve Removed at the North End Water Pollution Prevention Centre".

The Government of Manitoba issued a news release on September 17, 2002 entitled "North End Water Pollution Centre" that explained the plant shutdown and release of raw sewage into the Red River. The news release recommended that the river should not be used for recreational purposes or personal use, and advised that normal safety and handling procedures for fishing and consuming fish from the river should be observed.

Significant concern was expressed at the public hearings about the notification of downstream residents after the September 16, 2002 incident. The concerns were particularly strong at the Selkirk hearing where participants asked why the Rural Municipality of St. Clements was not immediately advised about the spill, and why some residents along the Red River were not informed. Several participants were particularly alarmed that First Nation communities

downstream from Winnipeg and around Lake Winnipeg were not notified about the sewage spill or the public health and the safety precautions that they should have taken in response to the spill.

People living along the Red River downstream from the City of Winnipeg commented that they know when there has been a sewage release or combined sewer overflow by the odours and floating debris. They commented that they have to cease activities near the river, clean up their equipment and wash their clothes. Downstream residents indicated that they were affected by both sewage spills and combined sewer overflow events, and requested that they be notified every time sewage is released or discharged into the river. It was also recommended that the City establish an inventory, map reference and monitoring system for every creek, culvert and sewage outfall along the Red and Assiniboine rivers.

A presenter at the Selkirk public hearing recommended that the City of Winnipeg install a 24-hour automated pollution monitoring station on the bridge north of Selkirk and provide the public with continuous information on water speed, water current, water level and water quality through the Internet (Exhibit 72). It was also suggested that warning flags be flown at all boat launches along the rivers indicating when there is a high fecal coliform count (Exhibit 58). The colour of the flag would indicate whether Manitoba's WQSOGs for primary or secondary recreation is exceeded. The warning system could also serve to raise the level of public awareness about Red River water quality.

The Commission believes the City and the Province have not lived up to the intent of the Commission's 1992 recommendation that a meaningful and practical public warning system be put into place for Winnipeg's rivers to advise of raw sewage discharge events. The public, particularly downstream residents and resource users, have a legitimate right to know when sewage spills occur whether they are accidental releases or combined sewer overflows. A notification system should therefore be developed by the Water and Waste Department consistent with best practices and current technology. The public should be involved in the design of the notification system to ensure that it is practical and effective. The system should be developed as a procedure within the framework of the Water and Wastewater EMS and it should be integrated into the Department's emergency response plan.

6.0 Recommendations

The following recommendations are provided as interim advice to the Minister of Conservation regarding the September 16, 2002 spill of raw sewage into the Red River from the City of Winnipeg's NEWPCC. The recommendations are based on evidence presented at public hearings held in Winnipeg from January 20 to 23, 2003 and in Selkirk from January 27 to 28, 2003. Further advice and recommendations on the sewage spill may be provided in the Commission's final report on the City's wastewater collection and treatment systems.

1. **The Water and Waste Department shall immediately begin to develop and implement an Environmental Management System (EMS) that addresses the City of Winnipeg's three WPCCs. The EMS shall be completed within two years (April 2005) with major components implemented much sooner.**

The City of Winnipeg should adopt the appropriate ISO I4000 EMS standards and the EMS should be registered and audited in accordance with those standards. A full-time staff member should be dedicated to the development and implementation of the EMS. The Water and Waste Department should begin this initiative with the preparation of an Environmental Policy for approval by Manitoba Conservation within six months (September 2003). The City's Civic Environment Committee should participate in the preparation of the Environmental Policy and provide support and assistance throughout the development and implementation of the EMS.

2. **The Water and Waste Department shall complete risk and criticality assessments at the City's three WPCCs within one year (April 2004).**

The results of the risk and criticality assessments should be used to establish on-site backup equipment and capability including replacement equipment and redundancy for critical equipment at the three WPCCs. In addition, the risk and criticality assessments should be implemented within the framework of the EMS.

3. **The Water and Waste Department shall begin immediately to prepare a training plan for all WPCC staff and complete the plan within one year (April 2004).**

The training plan should be prepared and implemented within the framework of the EMS, and the plan should be reviewed and updated annually. The training plan should provide for appropriate certification of all WPCC *Operators* according to nationally accepted standards for wastewater treatment facilities within one year.

4. **The Water and Waste Department shall prepare and implement standard operating and safe work procedures for the City's three WPCCs within six months (September 2003).**

Operating procedures for the City of Winnipeg's wastewater treatment facilities should be prepared and implemented within the framework of the EMS. The procedures should be reviewed and updated annually. Standard or best practice procedures from other jurisdictions should be adopted or adapted whenever possible. The Water and Waste Department should also conduct regular audits of the procedures to assess their effectiveness.

5. **The Water and Waste Department shall give immediate priority to the preparation of emergency response plans for the City's three WPCCs. The plans shall be completed and approved by Manitoba Conservation within six months (September 2003).**

The emergency response plans should be prepared and implemented within the framework of the EMS. Emergency response plans should meet national and provincial standards for emergency response planning. In addition, the plans should be rehearsed, reviewed and updated annually.

6. **The Water and Waste Department shall develop and implement a notification system to inform the public whenever there is release of raw sewage into the Red and Assiniboine rivers. The notification system shall be fully operational for the 2004 summer recreation season.**

The public notification system should be developed in consultation with appropriate civic and provincial departments, and regional health authorities. The system should take advantage of existing notification mechanisms in existence for air quality, public health and emergencies. The public should be notified whenever there is an accidental sewage spill, combined sewer overflow or sanitary sewer malfunction. The publics to be notified should include Winnipeg and downstream communities, including First Nations. They should be informed about the nature of the release, potential health risk, personal protection procedures and provided with sources for additional information.

Appendix A

Terms of Reference

Background

In June of 1992, the Clean Environment Commission issued a report entitled, "Report on Public hearings. Application of Water Quality Objectives for the Watershed Classification of the Red and Assiniboine Rivers and Tributaries Within and Downstream of the City of Winnipeg." That report contained a number of recommendations that related to the City of Winnipeg's wastewater collection and treatment systems. The Manitoba government accepted those recommendations. Subsequently, the City, in consultation with Manitoba Conservation and the scientific community, has implemented upgrades, undertaken studies and prepared plans to improve its systems.

A serious malfunction occurred at the North End Sewage Treatment Plant on Sept. 16, 2002 resulting in the discharge of untreated wastewater into the Red River raising concerns with respect to the backup capability of the systems.

Mandate of the Hearings

The Clean Environment Commission shall, pursuant to clause 6(5)(b) of The Environment Act, conduct public hearings to review the City of Winnipeg's wastewater collection and treatment systems and to receive public comments and concerns respecting the systems. Following the hearings, the Commission shall provide a report, with advice and recommendations, to the Minister in accordance with subsection 7(3) of The Environment Act. The Commission shall provide the report within 6 months of the date of the Minister's request to hold hearings. The Commission may at any time request that the Minister of Conservation review or clarify these Terms of Reference.

Scope of the Review

The Clean Environment Commission shall review the City of Winnipeg's wastewater collection and treatment systems and related public concerns and provide advice and recommendations on:

- The reliability of The City's systems, especially the backup capability of the systems to prevent a discharge of inadequately treated sewage to the rivers during malfunctions.
- The appropriate ammonia, nutrient, combined sewer overflow and microbiological limits on effluent from the City's systems necessary to protect the aquatic environment and recreational activities, including in Lake Winnipeg.
- The current and planned effectiveness of the City's systems in treating wastewater to achieve the discharge limits.
- The adequacy of the City's plans and schedule for upgrading its systems.
- The adequacy of processes being followed in reviewing those plans and schedules.

In doing so, the CEC should consider the applicable recommendations in the 1992 Commission report and the recently updated Manitoba Water Quality Standards, Objectives and Guidelines.

Appendix B

List of Registered Presenters

Name	Organization
Larry Strachan	Manitoba Conservation
Dwight Williamson	Manitoba Conservation
Mike Shkolny	City of Winnipeg
Barry MacBride	City of Winnipeg
George Rempel	Tetr*ES* Consultants/City of Winnipeg
Gordon Craig	Tetr*ES* Consultants/City of Winnipeg
David Morgan	Tetr*ES* Consultants/City of Winnipeg
Nick Szoke	City of Winnipeg
J. Oleszkiewicz	City of Winnipeg
Mike Van Den Bosch	Manitoba Conservation
Brian Konzelman	Manitoba Conservation
John Sinclair	Ad hoc Group
Glen Koroluk	Private
Merrell-Ann Phare	Ad hoc Group
Laura Orlando	Ad hoc Group
Rodney McDonald	Ad hoc Group
Kenton Lobe	Ad hoc Group
Paul MacKenzie	Private
Al Mackling	Winnipeg Game and Fish Association
Jolletta Brown	Winnipeg Game and Fish Association
Eva Pip	Private
Carolyn Garlich	Council of Women of Winnipeg
Ron Dalmyn	The Organization
Scott Kidd	Private
Barrie Briscoe	Environment Canada
Claude Fortin	Environment Canada
Roxanne Anderson	Private
Karl Pohl	Private
John Einarson	Private
Paul Clifton	Private
Jim Stinson	Private
Jane Seniw	Devil's Creek Watershed Coalition
Bob Shearer	Devil's Creek Watershed Coalition
Ed Marchuk	Private
Robert T. Kristjansen	Private
Jerry Moskalyk	Private
Laurel Sarginson	Private
Doug Taniguchi	Earth Tech Consultants Inc.
Dave Woytowich	Private
Al Roschuk	Private
Stu McKay	Manitoba Lodge and Outfitters Association
Darla Campbell	United Water Canada

Appendix C

List of Exhibits

No.	Exhibit*
* Bolded exhibits are referenced in the text of the report	
1.	***Letter* dated October 03, 2002 from the Hon. Steve Ashton, Minster of Conservation, to Terry Duguid, Chairman of the Clean Environment Commission.**
2.	**Terms of Reference for Clean Environment Commission Hearings into The City of Winnipeg's Wastewater Collection and Treatment Systems.**
3.	"Environmental Approvals Branch, Manitoba Conservation Clean Environment Commission Public Hearings City of Winnipeg Sewage Investigation January 20, 2003: Opening Comments by Larry Strachan, Director, Environmental Approvals Branch." Submitted by Larry Strachan, Manitoba Conservation.
4.	*Visual Projections*: "Manitoba Water Quality Standards, Objectives, and Guidelines 2002". Submitted by Dwight Williamson, Manitoba Conservation.
5.	"Final Draft – For Additional Review and Comment – Manitoba Water Quality Standards, Objectives, and Guidelines". Manitoba Conservation. November 22, 2002. Submitted by Dwight Williamson, Manitoba Conservation.
6.	*Visual Projections*: "Manitoba's Nutrient Management Strategy". Submitted by Dwight Williamson, Manitoba Conservation.
7.	"A Preliminary Estimate of Total Nitrogen and Total Phosphorus Loading to Streams in Manitoba Canada". Water Quality Management Section, Water Branch, Manitoba Conservation. November 2002. Submitted by Dwight Williamson, Manitoba Conservation.
8.	"Long-Term Trends in Total Nitrogen and Total Phosphorus Concentrations in Manitoba Streams". Water Quality Section, Water Branch, Manitoba Conservation. December 2001. Submitted by Dwight Williamson, Manitoba Conservation.
9.	***Visual Projections*: "Overview Presentation Winnipeg's Wastewater Pollution Prevention Plan: Presented to the Clean Environment Commission January 20, 2003 City of Winnipeg – Water and Waste Department". Submitted by Barrie MacBride, City of Winnipeg.**
10.	*Visual Projections*: "Ammonia Reduction in City of Winnipeg Wastewater Effluents: Ammonia Criteria Study". Submitted by George Rempel, Tetr*ES* Consultants Inc., Mike Shkolny, City of Winnipeg.
11.	"Summary: Ammonia Reduction in City of Winnipeg Wastewater Effluents". December 2002. Submitted by Mike Shkolny, City of Winnipeg.
12.	"Red and Assiniboine Ammonia Criteria Study: Final Technical Report". November 2002. Submitted by Mike Shkolny, City of Winnipeg.
13.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Fish Population Technical Memorandum #FP01: The Occurrence of External Deformities, Erosion, Lesions, and Tumours (Delts) on Fish from the Red and Assiniboine Rivers, 1999". Submitted by Mike Shkolny, City of Winnipeg.
14.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Technical Memorandum # T1.0: Phase 2 Toxicity Workstream: Ammonia Toxicity-Testing Program in 1999 and 2000." March 2001. Submitted by Mike Shkolny, City of Winnipeg.
15.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Technical Memorandum #RC2.0: River Conditions". January 2001. Submitted by Mike Shkolny, City of Winnipeg.

No.	Exhibit*
* Bolded exhibits are referenced in the text of the report	
16.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Fish Behaviour Technical Memorandum #FB04: Movements of 10 Northern Pike Tagged with Acoustic Transmitters in the Red River in the Vicinity of NEWPCC Effluent Plume, February-March, 2000". November 2000. Submitted by Mike Shkolny, City of Winnipeg.
17.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Fish Populations Technical Memorandum #FP02: Species Composition, Abundance, and Distribution of Fish in the Red and Assiniboine Rivers within the City of Winnipeg Ammonia Criteria Study Area, 1999". November 2000". Submitted by Mike Shkolny, City of Winnipeg.
18.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Other Stressors; Physical Constraints Memorandum # OSPC01: Other Stressors; Physical Constraints to Fish Populations in the Red and Assiniboine Rivers". September 2000. Submitted by Mike Shkolny, City of Winnipeg.
19.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Fish Population Technical Memorandum #FP03: Abundance, Composition, and Distribution of Benthic Invertebrates in the Red and Assiniboine Rivers Within the City of Winnipeg, 1999". July 2000. Submitted by Mike Shkolny, City of Winnipeg.
20.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Technical Memorandum #RH2.0: Phase 2 Other Stressors Workstream: Resource Harvesting Program Report for 1999". May 2000. Submitted by Mike Shkolny, City of Winnipeg.
21.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Fish Behaviour Technical Memorandum #FB02: Biological and Environmental Data from Experimental Netting in the Vicinity of the NEWPCC Outfall, October, 1999". February 2000. Submitted by Mike Shkolny, City of Winnipeg.
22.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Fish Habitat Technical Memorandum #FH03: Water Chemistry Data to Characterize Fish Habitat in the Red and Assiniboine Rivers". January 2000. Submitted by Mike Shkolny, City of Winnipeg.
23.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Fish Habitat Technical Memorandum #FH02: Benthic Invertebrate and Sediment Data to Characterize Fish Habitat in the Red and Assiniboine Rivers". January 2000. Submitted by Mike Shkolny, City of Winnipeg.
24.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Fish Habitat Technical Memorandum #FH01: Physical Data to Characterize Fish Habitat in the Red and Assiniboine Rivers". January 2000. Submitted by Mike Shkolny, City of Winnipeg
25.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Fish Behaviour Technical Memorandum #FB03: Movements of Fish Tagged with Acoustic Transmitters in the Vicinity of the City of Winnipeg's Water Pollution Control Centres, 1999 – 2000". Submitted by Mike Shkolny, City of Winnipeg.
26.	"Phase 2 Technical Memorandum for Red and Assiniboine Ammonia Criteria Study: Fish Behaviour Technical Memorandum #FB01: Biological and Environmental Data from Experimental Gillnetting in the Vicinity of the NEWPCC Outfall, March, 1999". August 1999. Submitted by Mike Shkolny, City of Winnipeg.
27.	*Visual Projections*: "Nutrient Characterization of Discharges from Winnipeg". Submitted by Nick Szoke, City of Winnipeg.

No.	Exhibit*
* Bolded exhibits are referenced in the text of the report	
28.	"City of Winnipeg Water and Waste Department Nitrification Study: Preliminary Design Report". November 2002. Submitted by Mike Shkolny, City of Winnipeg.
29.	"City of Winnipeg Water and Waste Department Nitrification Study: Conceptual Design Report". November 2002. Submitted by Mike Shkolny, City of Winnipeg.
30.	*Drawings*: "City of Winnipeg Water and Waste Department Nitrification Study: Conceptual Design Report". Submitted by Mike Shkolny, City of Winnipeg.
31.	*Visual Projections*: "Combined Sewer Overflow Management Study". Submitted by George Rempel, TetrES Consultants Inc., and Mike Shkolny, City of Winnipeg.
32.	*Letter*, dated September 11, 2002 from Chris Leach, CSO Advisory Committee to Nicolas T. Szoke, City of Winnipeg.
33.	"Executive Summary: Combined Sewer Overflow Management Study". Submitted by Mike Shkolny, City of Winnipeg.
34.	"Final Report: Combined Sewer Overflow Management Study". Submitted by Mike Shkolny, City of Winnipeg.
35.	"Report to City of Winnipeg Water and Waste Department: Combined Sewer Overflow Management Study: Volume 1, 2, 3, 4 (of 4)". Wardrop Engineering Inc. and TetrES Consultants Inc. Submitted by Mike Shkolny, City of Winnipeg.
36.	*Visual Projections*: "Wastewater Effluent License Limits." Submitted by Nick Szoke, and J. Oleszkiewicz, City of Winnipeg.
37.	*Visual Projections*: "Proposed Effluent Limits for City of Winnipeg Sewage Treatment Plants". Submitted by Mike Van Den Bosch, Manitoba Conservation.
38.	"Environmental Approvals Branch, Manitoba Conservation - Clean Environment Commission Public Hearings City of Winnipeg Sewage Investigation – January 2003: Recommended Effluent Discharge Limits for City of Winnipeg Sewage Treatment Plants" Mike Van Den Bosch, A/Manager, Municipal, Industrial and Hazardous Waste Approvals Section. Submitted by Mike Van Den Bosch, Manitoba Conservation.
39.	***Visual Projections*: "Wastewater Systems Reliability by City of Winnipeg, Water and Waste Department for Clean Environment Commission Hearings, January 2003". Submitted by Mike Shkolny, City of Winnipeg.**
40.	**"Report on the Shutdown of the North End Water Pollution Control Centre on September 16, 2002". Winnipeg Water and Waste Department. December 19, 2002. Submitted by Mike Shkolny, City of Winnipeg.**
41.	**"Final Summary Report: City of Winnipeg North End Water Pollution Control Centre Review of Failure". Associated Engineering. January 2003. Submitted by Mike Shkolny, City of Winnipeg.**
42.	*Visual Projections*: "Investigation Report: Raw Sewage Discharge to The Red River – City of Winnipeg North End Sewage Treatment Plant". Submitted by Mike Van Den Bosch and Brian Konzelman, Manitoba Conservation.
43.	**"Investigation Report Raw Sewage Discharge to the Red River – City of Winnipeg North End Sewage Treatment Plan". Manitoba Conservation. January 2003. Submitted by Mike Van Den Bosch, Manitoba Conservation.**
44.	*Visual Projections*: Water Quality Assessment Following Release of Raw Sewage from the City of Winnipeg, September 2002". Submitted by Dwight Williamson, Manitoba Conservation.
45.	**"Water Quality Assessment of the Red River and Lake Winnipeg Following Release of Raw Sewage from The City of Winnipeg, September 2002". Water Quality Management Section, Water Branch, Manitoba Conservation. November 2002. Submitted by Dwight Williamson, Manitoba Conservation.**

No.	Exhibit*
* Bolded exhibits are referenced in the text of the report	
46.	***Visual Projections*: "Summary of Winnipeg's Plan to Improve Wastewater Treatment". Submitted by Mike Shkolny, City of Winnipeg.**
47.	*Visual Projections*: "Environmental Approvals Branch (EAB) Comments on City of Winnipeg Recommendations". Submitted by Larry Strachan, Manitoba Conservation.
48.	**"Environmental Approvals Branch (EAB) Comments on City of Winnipeg Recommendations to the Clean Environment Commission Public Hearings – January 20, 2003". Larry Strachan, Director, Environmental Approvals Branch, Manitoba Conservation. Submitted by Larry Strachan, Manitoba Conservation.**
49.	***Motion:* #1 [Respecting Hearing Suspension]. Submitted by John Sinclair, Ad hoc Group.**
50.	***Motion:* #2 [Respecting Hearing Suspension]. Submitted by John Sinclair, Ad hoc Group.**
51.	***Visual Projections*: "Manitoba Clean Environment Commission Public Hearing: City of Winnipeg Wastewater Collection and Treatment System – Winnipeg, Manitoba, 21 January 2003: Presenters: Merrell-Ann Phare, John Sinclair, Laura Orlando, Rodney C. McDonald, Kenton Lobe. Submitted by Merrell-Ann Phare, John Sinclair, Laura Orlando, Rodney C. McDonald, Kenton Lobe, Ad hoc Group.**
52.	"Biographies of Funded Participants Submitted by Merrell-Ann Phare, John Sinclair, Laura Orlando, Rodney C. McDonald, Kenton Lobe, Ad hoc Group.
53.	***Appendices*: "Manitoba Clean Environment Commission Public Hearing: City of Winnipeg Wastewater Collection and Treatment System – Winnipeg, Manitoba, 21 January 2003: Presenters: Merrell-Ann Phare, John Sinclair, Laura Orlando, Rodney C. McDonald, Kenton Lobe". Submitted by Merrell-Ann Phare, John Sinclair, Laura Orlando, Rodney C. McDonald, Kenton Lobe, Ad hoc Group.**
54.	"A Plan to Manage Household Hazardous Waste in Manitoba". Manitoba Conservation. July 2001. Submitted by Merrell-Ann Phare, John Sinclair, Laura Orlando, Rodney C. McDonald, Kenton Lobe, Ad hoc Group.
55.	**"Plan Winnipeg 2020 Vision". City of Winnipeg. Submitted by Merrell-Ann Phare, John Sinclair, Laura Orlando, Rodney C. McDonald, Kenton Lobe, Ad hoc Group.**
56.	*Brief*: "Prepared for Manitoba Clean Environment Commission Hearings By Winnipeg Game and Fish Association – January 21, 2003. Submitted by Al Mackling, Winnipeg Game and Fish Association.
57.	***Brief*: "A Brief on the Downstream Impacts of The City of Winnipeg Wastewater Treatment Plant Effluents". Submitted by Eva Pip.**
58.	***Brief*: "Brief to the Clean Environment Commission Hearing on Winnipeg's Waste Water Collection and Treatment Systems – January 21, 2003". Submitted by Carolyn Garlich, Council of Women of Winnipeg.**
59.	***Brief*: "Lake Winnipeg and Winnipeg's S.T.P. Spill January 21/2003". Submitted by Ron Dalmyn, The Organization.**
60.	***Brief*: "Presentation to the Manitoba Clean Environment Commission regarding the City of Winnipeg's Wastewater Collection and Treatment Systems". Submitted by Scott Kidd.**
61.	***Visual Projections*: Proposed Risk Management Strategy Addressing Ammonia, Inorganic Chloramines and Chlorinated Wastewater Effluents – Winnipeg, Manitoba January 21, 2003". Environment Canada. Submitted by Barry Briscoe and Claude Fortin, Environment Canada.**
62.	"Pollution Prevention Planning for Ammonia, Inorganic Chloramines and Chlorinated Wastewater Effluents in Municipal Wastewater Effluents: Working Document: Part 4 of

No.	Exhibit*
* Bolded exhibits are referenced in the text of the report	
	the Canadian Environmental Protection Act, 1999". Environment Canada. July 2002. Submitted by Claude Fortin, Environment Canada.
63.	"Proposed Risk Management Strategy addressing Ammonia, Inorganic Chloramines and Chlorinated Wastewater Effluents under CEPA 1999: Pollution Prevention Planning as a Fist Step Toward a Long-term Strategy for Managing Wastewater Effluents". Environment Canada. August 2002. Submitted by Barrie Briscoe and Claude Fortin, Environment Canada.
64.	"Proposed Risk Management Strategy addressing Ammonia, Inorganic Chloramines and Chlorinated Wastewater Effluents under CEPA 1999: Report of Consultation Sessions August 20th to November 4th, 2002: Summary of Input from Participants". Environment Canada. December 2002. Submitted by Barry Briscoe and Claude Fortin, Environment Canada.
65.	"Environment Canada Proposed Risk Management Strategy Addressing Ammonia, Inorganic Chloramines and Chlorinated Wastewater Effluents Under CEPA 1999: 2nd Table Discussion (Recorder Notes): Feedback on Pollution Prevention Planning Implementation Issues, Winnipeg, MB". Environment Canada. Submitted by Barry Briscoe and Claude Fortin, Environment Canada.
66.	"Federal Register: Part VII: Environmental Protection Agency: Combined Sewer Overflow (CSO) Control Policy; Notice: Tuesday April 19, 1994." Submitted by the Manitoba Clean Environment Commission.
67.	*Excerpts*: "Combined Sewer Overflows: Guidance For Long-Term Control Plan" United States Environmental Protection Agency. Pages 3-7, 3-8, 3-9, 3-10. Submitted by George Rempel, Tetr*ES* Consultants Inc. and Mike Shkolny, City of Winnipeg.
68.	*Excerpts*: "Health Effects Criteria for Fresh Recreational Waters". United States Environmental Protection Agency. August 1984. Page iv. Submitted by the Manitoba Clean Environment Commission
69.	*Excerpts*: "Ambient Water Quality Criteria for Bacteria – 1986" United States Environmental Protection Agency. January 1986. Page 16 and Table 4. Submitted by the Manitoba Clean Environment Commission.
70.	*Excerpts*: "Guidelines for Water Reuse: Manual". United States Environmental Protection Agency. September 1992. Pages 133 and 134. Submitted by the Manitoba Clean Environment Commission.
71.	*Brief*: "Manitoba Clean Environment Commission - Share Your Views: City of Winnipeg Wastewater Collection and Treatment System". Submitted by Roxanne Anderson.
72.	***Brief*: "Re: Public Hearings scheduled for January 27/28 in Selkirk: Comments and Observations". Submitted by Karl Pohl.**
73.	*Brief*. Submitted by John Einarson.
74.	*Brief*. "Presentation to Manitoba Clean Environment on City of Winnipeg Sewage Systems. January 27, 2003". Submitted by Paul Clifton.
75.	*Brief*. "Devil's Creek Watershed Coalition". Submitted by Jane Seniw and Bob Shearer, Devil's Creek Watershed Coalition.
76.	*Brief*. Submitted by Jerry Moskalyk.
77.	*Brief*. Submitted by Laurel Sarginson.
78.	*Visual Projections*: "City's Proposed Ammonia Loadings". Submitted by George Rempel, TetrES Consultants Inc. and Mike Shkolny, City of Winnipeg.
79.	***Visual Projections*: "Manitoba Clean Environment Commission Hearing: City of Winnipeg Wastewater Collection and Treatment Systems". Submitted by Dave Woytowich.**

No.	Exhibit*
* Bolded exhibits are referenced in the text of the report	
80.	*Brief*. Submitted by Stu McKay, Manitoba Lodge and Outfitters Association.
81.	*Brief*: "Presentation to Manitoba Clean Environment Commission Public Hearing: January 28, 2003, Selkirk, Manitoba". Submitted by Darla Campbell, United Water Canada.
82.	***Response to Motion*. Submitted by Manitoba Clean Environment Commission.**